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Defense Spending and the US Economy (U)

Volume III
Appendix K

by

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The conclusions and recommendations of this paper are those of the authors and not necessarily of the Operations Research Office. No official approval of the Department of the Army, express or implied, should be inferred.

Appendix K

SOME ASPECTS OF THE US STOCKPILING PROGRAM

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In the calendar year 1956 the United States Government accepted delivery on at least 55 major market classifications of minerals under four stockpile programs (PL 520 stockpile contracts, Defense Production Act contracts, CCC barter contracts, and domestic purchase programs). The analysis in this report is limited to 9 mineral categories which represent the major items of value: cobalt, copper, industrial diamonds, lead, metallurgical manganese, nickel, titanium metal, tungsten, and zinc.

There is no single cost concept which satisfies all needs for analyzing effects of stockpiling. To meet this problem several cost concepts are estimated and are presented in the summary table. The supporting work sheets are also appended.* One section also explains the "present value" aspect of the cost concepts. One is reminded that these cost estimates are presented as background information rather than as determining criteria.

Total costs is the (algebraic) sum of net costs to the Government plus indirect costs to the economy. Net costs to the Government equal program costs plus the present value of administration, interest, and storage costs over the life of the stockpile plus decreases (or increases) of the duty income.

It may be observed that the largest cost elements are the present value of costs of holding the stockpiles over some period of time. Thus, all costs are computed for the year of procurement of the mineral quantity in question. For most minerals the program costs are not too great; program costs are the extra amounts paid for the mineral above what is considered to be a long run disposal price. The main exception to this is tungsten, for which most delivery is at more than twice the market price. Total governmental budgeted expenditures are also estimated because of the pertinence of these amounts to stockpiling decisions, especially in calendar 1956.

There are also two kinds of indirect costs to the economy which are usually taken account of (in this office) in estimating the effects of any government program which has a material impact on a mineral market. These costs are costs to consumers and costs to US exporting industries.

* On file in ORO.

All costs in question are counted algebraically and thus negative costs are benefits to the group in question. In these examples the effects on export industries are in each case beneficial because of increases of imports of minerals from abroad, and these "benefits" partly offset the costs to consumers in estimating total indirect costs to the economy. The method of estimating costs to consumers is designed to take account of costs of shifting from use of these minerals to other, substitute minerals as the prices of these minerals rise. Thus, the computation is based upon the statistical demand curve (at constant national income in constant dollars) for each mineral and the decline in "consumers' surplus" involved.

A minor problem of interpretation arises in counting duty income. Duties are counted as collected on imports for Government stockpiling, and duty income is subtracted from costs to the Government and from budgetary outlays. This computational procedure is followed even though the Government does not go through these motions in its administrative procedure because our computations enable taking account of Government prices and market prices in the simplest way, and because our procedure more accurately reflects the economic consequences involved (i.e., the Government buys at the present US market price minus duty, except on certain fixed contracts).

All estimates on the work sheets indicate the exact computational steps involved except for the first six items, which represent estimated equilibrium market values of price, domestic mine output, domestic secondary production (in several cases), net imports for consumption and Government use, private consumption and reported additions to private stocks, and total Government stockpiling. These amounts were estimated from statistical supply and demand relations for all the items except Government stockpiling, which is an historical, given amount for 1956 and which was also assumed to be zero for 1956 to estimate all the cost effects of stockpiling.

DATA TABLE

	Units	Amount procured*	Budget outlay	Program costs	Present value of: Admin., int., storage	Indirect costs	Total costs
			(Million dollars)				
Cobalt	000 lb.	9,916	25.8	4.5	25.8	2.9	33.1
Copper	000 S.T.	71.6	58.5	16.5	75.0	73.7	167.2
Industrial diamonds	000 cts.	9,870	43.9	7.4	43.9	3.8	55.3
Lead	000 S.T.	102.5	32.0	2.1	32.8	17.7	51.7
Manganese, met. grade	000 LTU	11,414	94.0	34.0	112.0	10.0	129.2
FeMn	000 L.T.	240					
Nickel	S.T.	13,722	27.8	7.7	27.9	1.2	36.7
	NiO S.T.	1,755					
Titanium metal	S.T.	4,319	24.5	5.6	27.2	4.5	36.6
Tungsten	Mil.lb.	29.0	99.2	42.4	99.6	(0.6)	140.3
Zinc	000 S.T.	177.7	46.9	5.3	47.9	30.8	83.0
Total			452.6	125.5	459.3	144.0	733.1

* The only column of classified information

Stockpiling Costs Over Time

There is only one cost category which is seriously changed as cost computations are carried over into successive time periods, following the initial period of an action under a program, in order to determine the present value of all expected costs stemming from action under a program during a (one-year) time period. The cost category so changed is "Administration, storage and interest" (ASI) costs. This cost category is significant now only in stockpiling type programs but could also be important in programs of maintaining standby facilities which may become more important than they are now. With all other cost categories there is a major cost effect only during the period (say, year) in which an action under the program takes place.

In stockpiling programs there are actually two sets of cost effects in later years: first, that encompassed under the above cost category, and second, the effects upon Net Costs to the Economy of later getting rid of the stocks. The first of these two sets of effects is much more important. Computed on a present value basis so that all costs of a program action are counted in the period of the action, the first set of costs has a present value approximately equal to the procurement cost of the stocks accumulated by the action. The second set of costs has a present value of between one-tenth to one-third of the computed figure Net Costs to the Economy at the time when they take place if the disposal of stocks occurs between 20 and 30 years later.

There are several variables involved in computing both of these sets of costs. These variables include: (1) average date at which stocks will be disposed of; (2) average interest rate until that time; and (3) actual future values of administrative and storage costs and Net Costs to the Economy.

It is unclear whether such stocks will ever be disposed of, let alone when. If they are never to be resold, the length of life of the stockpile is infinite, and the two sets of costs approach limiting values, the first, the procurement price times the reciprocal of the annual rate of ASI costs as a percent of the procurement rate (this comes to about ten or fifteen times the procurement cost), and the limiting value of the second set of costs equals zero.

A reasonable high value of the average annual rate of the three ASI costs is 10 percent of the procurement costs, and 5 percent is a decidedly low value. If the length of stock life is 20 years and if administrative and storage costs average 4 percent, the multiple which the present value of ASI costs is of the procurement expenditure is 1.09 for an interest rate of 4 percent, and 1.18 for 8 percent. These

two multiples, for administrative and storage costs of 2 percent, are 0.82 and 0.98. These four multiples for 30 years are 1.38, 1.34, 1.04, and 1.13, respectively. In view of the uncertainties involved, the present values of ASI costs may be taken equal to procurement expenditures as a useful convention of estimation.

A conventional coefficient for the present value of Net Costs to the Economy is not as easy to choose because the series of values converges to zero. If the time period is 20 years, the present value coefficient is 0.456 at 4 percent, and 0.235 at 8 percent, and at 30 years the values are 0.308 and 0.114, respectively. Perhaps a prudent value is 0.20, the conventional value chosen.

For estimates of actual average future values of ASI costs and Net Costs to the Economy it is probably not worth attempting a refined calculation unless conditions can be expected to change very markedly in relevant respects from the present and in a clearly foreseeable manner. Therefore, in most instances present values of these costs will be used according to the described computational conventions. This is especially appropriate inasmuch as the cost computations are proposed as background information rather than as determining criteria.